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quicksilver inside, but presses upon that in the basin; the quicksilver in the tube, which tends naturally to fall down into the basin, is thus forced to remain up in the tube by the pressure of external air; and it rises so high that the pressure inside, of the quicksilver, and outside, of the air, is equal. If the pressure of the air diminishes, the quicksilver falls; if the pressure of the air increases, the quicksilver rises: and as all great changes of the air are connected with changes of the weather, the barometer is generally known and consulted as a sort of weather-glass.

Every space of an inch square supports fifteen pounds weight of air; at the rate of ten ounces to a hogshead, the depth of the air would therefore be about five miles. But it is much deeper, for air is what is termed compressible—that is to say, it may by pressure be squeezed into a smaller bulk; and hence the air next the ground, being compressed by the portions above it, is much the heaviest portion. At three miles high a hogshead of air weighs only five ounces, and at eight miles high only two ounces; hence the limits of the air are much farther removed, and it is known to extend to at least forty miles.

The office of the air is to support animal life: no animal can live without air: even fishes require air. The water in which they swim contains air mixed with it, and this water washing the gills, which are their lungs, serves to them as the air directly acts on us. If we boil water until the air is expelled from it, and let it cool in a close vessel, we may drown a fish by putting it into such water, as easily as a land animal; it could not breathe. It is thus that in the lakes on the tops of very high mountains there are no fish. The heights are deserted by land and by water animals, in consequence of the air being too thin to support life. The way in which the air acts upon the body is very interesting. The most abundant element of our food is what the chemists term carbon, of which, in a gross manner, charcoal may serve as an example. Now, we eat much more of this than we require for the supply of our bodies, and it must be got rid of. This is done by its uniting in the body with a substance termed oxygen, and forming carbonic acid, the sort of air which boils up in soda water and ginger beer. This dissolves in the blood, colouring it a deep purple, and escapes from it when by the action of the heart the black blood is exposed to the action of the air on the surface of the lungs. Now, the office of the air is to supply this oxygen which removes the carbon from the blood. But the air is not pure oxygen. If it were, it would act too violently. An animal which breathes pure oxygen, becomes flushed, pants violently, and, if not choked, dies of inflammation of the lungs, produced by the intense action. In the air we breathe, the oxygen gas is diluted to the proper degree by another gas, termed nitrogen, which is totally destitute of power; it does of itself no good and no harm; it is the only substance that could be mixed in the air we breathe, without interfering in any way. When thus the blood loses, by exposure to the air in the lungs, its carbonic acid, it takes oxygen in its place; from dark purple it becomes bright red, and is then proper to take up a fresh quantity of carbon, and to sustain the body in health by its removal.

When any thing burns in the air, it is the oxygen which is active. The nitrogen dilutes here also the oxygen, and keeps its activity down to the degree most suitable to our wants. If the air were pure oxygen, all our domestic fires would be violent conflagrations; our iron pokers and tongs, if heated red hot, would take fire and burn like squibs; no comfort, no safety for society could exist. But in burning, this oxygen is destroyed. If a candle be placed lighted under a glass bell, it will, after a little, go out. The air will become unfit to support combustion. Here also, as well as in the burning of coals, coke, gas, oil, charcoal, &c. the oxygen is changed into carbonic acid, and precisely as a fresh supply of oxygen is necessary for the continuance of life, so is it for combustion.

The air contains about one part in five of oxygen, and, as has been seen, this oxygen is liable to continual destruction by the breathing of animals and the burning of fuel and of lights. An ordinary man spoils in twenty-four hours 720 cubic feet of air, that is, a mass of air 11 feet 6 inches square and 6 feet thick. The burning of three ounces of charcoal, or of a mould candle of six to the pound, produces the same effect. It is not unusual in a factory to burn ten tons of coal a-day, which spoils 3,185,760 cubic feet of air, a mass of a quarter of a mile square and six feet thick. If we multiply these numbers by the number of inhabitants, of man and of

all other animals upon the earth, and also by the quantity of fuel burned all over the globe, it will be evident that without some regulating power superior to all that mere human means could devise, the air might ultimately become unfit to be the sustenance of living beings, and all the numerous tribes of animated nature which now adorn its surface, would be destroyed.

By the all-wise arrangement of Providence, however, the animals, in thus converting the oxygen of the air into carbonic acid, become the means of supplying nourishment to another class of beings equally interesting and numerous. All vegetables breathe; but as animals take in too much carbon with their solid food, so do plants obtain too little from the substances that give nourishment to their roots. The animal breathes to give off carbon, the vegetable breathes to take it up. The two great divisions of living nature thus act in contrary ways upon the air; the oxygen consumed by the animal or by combustion, is given out again by the carbon of the carbonic acid becoming fixed in the plant of which it forms the woody mass; and thus the composition of the air is kept balanced at its proper point, and provision for the due nutrition of animals and vegetables is secured.

The air we breathe serves, however, for other important uses. Without the air, the fresh breezes which moderate the heats of summer could not exist, and there would prevail in nature an eternal silence, for it is by means of air that we not only breathe, but hear. The variety of aspect given to the sky by the formation and rapid change of clouds, arises from the mixture of warm and of cold damp air. If there was no air, there might be dew, but there could never be a cloud.

Without the air we could not have the bright blue sky which gives to our fine season its greatest charm. The heavens would be a vault of intense black, in which the sun would appear alone a glaring ball of fire, whose rays, unmitigated by the air which now absorbs them in their passage through its mass, would be a continual source of ill. The blue sky, the bright white clouds, arise from the sun's rays being partly stopped, and turned from one object to another. The sun's rays really consist of light of all the colours of the rainbow; of these the red portion is lost in passing through the air, and the blue remains, giving the colour we observe. Without the air, a place shaded from the sun would be in absolute darkness; as it now exists, a quantity of light is scattered about in every way by the different portions of the air, and thus an agreeable shade provided in place of the total absence of all light. On very elevated tops of mountains, where the traveller is placed above the greater portion of the air, all these effects of its absence which we have noticed, are found to exist. On the summit of Mont Blanc, a pistol discharged is scarcely heard, and a companion once out of sight, may be lost; for neither can he produce any noise by his own exertions, nor could his voice reach his friends, even if he could speak; the sky is deep indigo-coloured, or nearly black; and those objects on which the sun's light does not directly fall, are seen with difficulty.

Such are the uses of the common air we breathe. Such are the benefits we derive from a blessing, of whose existence when at rest we are almost unconscious.

ABSENCE OF MIND.—A well-known gentleman of Magdalen College, Cambridge, had taken his watch from his pocket, to mark the time he intended to boil an egg for his breakfast, when a friend entering the room, found him absorbed in some abstruse calculation, with the egg in his hand, upon which he was intently looking, and the watch supplying its place in the saucepan of boiling water.

EARLY RISING.—Six or seven hours' sleep is certainly sufficient, and no one ought to exceed eight. To make sleep refreshing, the following things are requisite:—To take sufficient exercise in the open air; to avoid strong tea or coffee; to eat a light supper; and to lie down with a mind as cheerful and serene as possible. We hardly ever knew an early riser who did not enjoy a good state of health. It consists with observation, that all very old men have been early risers. This is the only circumstance attending longevity, to which we never knew an exception.